

REMARKS

Claims 1-3 and 12-22 stand reject d under 35 USC 103(a) on the basis of USP 4,099,115 to Wanatabe in combination with USP 5,898,234 to Kitagawa.

Claims 5-11 rejected as depending from a rejected claim were indicated to be allowable if rewritten in independent form. Pending the Examiner's review of this amendment these claims are being kept in their original form.

For the reasons discussed below the rejection of Claims 1-3 and 12-22 on the basis of USP 4,099,115 to Wanatabe in combination with USP 5,898,234 to Kitagawa is respectfully traversed. The combination of these references does not show, teach or suggest the claimed invention.

For purpose of illustration claim 1 will first be discussed. Note that claim 1 has been amended to delete the term "current" modifying the "switch". Claim 1, as amended, now calls for a "selectively enabled switch". This amendment is made to clarify that any switch may be used to practice the invention.

Claim 1, as amended, calls for a load to be connected across the first and second terminals of a battery and for "a circuit for sensing the condition of the battery." The circuitry for sensing the condition of the battery includes a series loop comprising a current source connected in series with a resistor, the battery and a selectively enabled switch. The claim further calls for sensing the voltage across the resistor and across the battery for the condition when the switch is open and when it is closed. As is explained in the specification and the drawings, Applicant's invention is directed to sensing the **change in the voltage across the battery due to a current source current flowing through the**

battery. This enables the battery resistance to be determined. As further discussed below this is not shown, taught or suggested in the cited references.

Contrary to the Examiner's contention, Claim 1, as amended, (but even in its original form, is not shown, taught or suggested in the combination of Wanatabe and Kitigawa. Wanatabe does not disclose: (1) a battery charging system; (2) a selectively enabled switch in series with a resistor, the battery, and a current source; and (3) means for measuring the voltage across the battery for the condition when the selectively enabled switch is open (and the current source current does not flow through the battery) and closed (and the current source current flows through the battery).

It can be readily demonstrated that Wanatabe does not show, teach or suggest Applicant's claimed structure and function. An examination of the Wanatabe reference reveals that Wanatabe discloses a circuit for generating a constant voltage, V_o , at the output of an operational amplifier (A in Fig. 1 of the reference), which voltage (V_o) is to remain constant as a function of temperature. Wanatabe includes an operational amplifier at whose input is connected: (a) a first circuit which includes a current source of a type to produce an output voltage having a positive temperature characteristic; (b) a second circuit connected between the input and the output of the operational amplifier for producing a voltage at the output of the op-amp having a negative temperature characteristic; and (c) means for adjusting various resistors to adjust the voltage V_o at the output of the operational amplifier so it is constant as a function of

temperature. Thus, Wanatab does not show, teach or suggest Applicant's claimed structure and/or function.

The Examiner's attention is directed to the fact that Wanatabe shows a battery "E" which is used to power the circuitry producing Vo. There is no suggestion in Wanatabe to switch a current into the battery E and measure the voltage across the battery E when a current is switched so as to flow in the battery. Thus, it is again demonstrated that Wanatabe does not show, teach or suggest Applicant's claimed structure and/or function.

Furthermore, even if it were reasonable to combine the Wanatabe and Kitagawa reference (which is submitted to be an improper combination), the combination does not show, teach or suggest Applicant's invention. In Kitagawa an external power supply is used to: (a) supply power to a load 43; and (b) charge a battery 33 via switches 71, 72, an inductor (L) and a resistor (R). When the external power supply is not present or falls, the battery 33 supplies current to the load 43. Sensing circuitry in Kitagawa is used to determine when the external power supply is missing and to "generate a charge control signal for maintaining constant-voltage/constant current characteristic of the output of the charger 32." (col. 10 lines 13-16). Thus, when the external power supply is present a constant charge current is supplied to a battery 33 to charge the battery. When the external power supply falls the battery 33 is used to power the load. There is no teaching or suggestion of supplying a current source current (on top of a load current) to the battery for sensing the change in

battery voltage due to the current source current supplied to the battery in order to determine the resistance of the battery.

In accordance with Applicant's invention a test current (other than the load current) is selectively supplied to the battery to sense the change in the value of the battery voltage to enable the determination of its resistance. This is structurally and functionally different from the teachings and showings of Kitagawa alone and in combination with Wanatabe.

It is not understood how Kitagawa can be combined with Wanatabe. But, even if combined, Applicant's invention is not suggested by the combination of these references.

Accordingly, claim 1, as amended (and even in its original form), defines patentably over Wanatabe and Kitagawa.

Claim 2 is submitted to be patentable for at least the same reasons as claim 1.

Claim 3 which claims the sensing of the change in battery voltage for determining the resistance of the battery is submitted to be patentable for its own reasons as well as those adduced for claim 1.

Claim 4 calling for the sensed information to be supplied to a microprocessor for determining the battery resistance is submitted to be patentable for its own reasons as well as those adduced for claim 1.

Claims 5-11 were indicated to be allowable if rewritten in independent form are being kept in their original dependent state pending the Examiner's review of this amendment.

Note that claims 6 and 7 have been amended to clarify the interconnection of the battery and power supply.

Claim 8 has been amended to correct a typographical error.

Accordingly, it is submitted that claims 5, 6-8, as amended, and 9-11 are in condition for allowance.

Claim 12 has been amended and, as amended, is similar to claim 1. Note that claim 12 but specifically calls for a "circuit for sensing the internal resistance of the battery". Amended claim 12, like claim 1, is submitted to define patentably over the cited references and it is submitted to be patentable for its own reasons as well as those advanced for claim 1, above.

Claim 13, dependent from claim 12, is submitted to be patentable for its own reasons as well as those adduced for claims 1 and 4.

Independent claim 14 is submitted to be patentable for at least the same reasons as claims 1 and 12.

Claim 15, has been amended to correct a typographical error.

Claim 15, as amended, and claim 16 and 17 are submitted to be patentable for their own reasons as well as those adduced for claims 1, 12 and 14.

Independent claim 18 is a method claim calling for various steps including the step of calculating the value of the battery resistance. This is not shown, taught or suggested in the cited references. Accordingly, claim 18 is submitted to be patentable over the references of record for this reason as well as those adduced for claim 1, 12 and 14.

Claims 19-22, dependent from claim 18 are submitted to be patentable for their own reasons as well as those adduced for claim 18.

Claim 23, dependent from amended claim 1, has been added to call for the current source generating the first current to be a constant current generator. This circuitry is not shown or suggested in the references. Accordingly claim 23 is submitted to be patentable for its own reasons as well as those adduced for amended claim 1.

In conclusion, the allowance of claims 1-23, presently active in this application is respectfully requested.

Enclosed is a check for \$9.00 to pay for the examination of newly added claim 23.

Respectfully Submitted



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Dated:

12/29/03